

Hall Ticket Number :

R-20

Code: 20A241T

II B.Tech. II Semester Regular Examinations August 2022

**Electrical Machines - II**

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two mark**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- | 1. Answer ALL the following short answer questions ( 5 X 2 = 10M )                       | CO  | Blooms Level |
|--|-----|--------------|
| a) Define crawling and cogging.  | CO1 | L1           |
| b) List various types of starting methods  | CO2 | L1           |
| c) Explain how Torque-Slip Characteristics vary when adding resistance to rotor circuit? | CO3 | L3           |
| d) Write down the importance of Regulation.  | CO4 | L2           |
| e) What is hunting? Explain?   | CO5 | L1           |

**PART-B**Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO Blooms Level

**UNIT-I**

- |  |    |     |    |
|--|----|-----|----|
| 2. a) Describe with neat sketches the construction of a 3-phase cage-type induction motor  | 6M | CO1 | L2 |
| b) A 3-phase, 50 Hz, 4 pole slip ring induction motor gives a reading of 120 V across slip rings on open circuit, when at rest and supplied with normal supply voltage. The rotor impedance per phase is $0.3 + j1.5$ . Find the rotor current and torque when machine is running at 5 % slip. | 6M | CO1 | L3 |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Explain Torque-Slip characteristics of Induction motor  | 8M | CO1 | L2 |
| b) If an 8-pole induction motor running from a supply of 50HZ has an emf in the rotor of frequency 1.5HZ, compute the slip and speed of the motor | 4M | CO1 | L2 |

**UNIT-II**

- |  |     |     |    |
|--|-----|-----|----|
| 4. What is the necessity of starter and with neat diagram explain star –delta starting method of three phase induction motor | 12M | CO2 | L2 |
|--|-----|-----|----|

**OR**

- |   |     |     |    |
|---|-----|-----|----|
| 5. Explain the principle of induction generator operation | 12M | CO2 | L2 |
|---|-----|-----|----|

**UNIT-III**

6. a) Why is the single-phase induction motor not self-starting? Explain. 6M CO3 L3
- b) What are the advantages of the capacitor-start motor over the split phase motor? 6M CO3 L2

**OR**

7. A 1100/400V, 1-phase transformer gave the following test results: Open circuit test: 1100V, 2A, 180W on L.V. side  
Short circuit test 20V, 25A, 20W on H.V. side, Calculate the equivalent circuit constants. Also draw the equivalent circuit. 12M CO3 L3

**UNIT-IV**

8. a) Why is a rotating field system used in preference to a stationary field? 6M CO4 L2
- b) A star connected 3phase 4pole 50Hz alternator has a single layer winding in 24 stator slots. There are 50 turns in each coil and the flux per pole is 0.05 Wb. Find the open circuit voltage. 6M CO4 L3

**OR**

9. a) Derive an expression for synchronizing torque when a 3-phase alternator is connected to infinite busbar. 6M CO4 L2
- b) Two alternators A and B operate in parallel and supply a load of 10MW at 0.8pf lagging. (i) By adjusting steam supply of A, its power output is adjusted to 6,000KW and by changing its excitation, its P.F is adjusted to 0.92 lag. Find the Power Factor of alternator B. (ii) If steam supply of both machines is left unchanged, but excitation of B is reduced so that it's P.F becomes 0.92 lead, find new P.F of A. 6M CO4 L3

**UNIT-V**

10. a) Discuss and state the conditions necessary for paralleling alternators. 6M CO5 L2
- b) What are the various methods of synchronizing alternators? 6M CO5 L2

**OR**

11. a) Name the different starting methods of synchronous motor, explain how the synchronous motor can start with help of damper winding. 6M CO5 L2
- b) A 75KW, 400V, 4-pole, 3-phase, 50Hz, star connected synchronous motor has a resistance and synchronous reactance of 0.04 and 0.4 , respectively. Compute for full load 0.8pf lead the open circuit emf per phase and gross mechanical power developed. Assume an efficiency of 92.5%. 9M CO5 L3

\*\*\* End \*\*\*

Hall Ticket Number :

R-20

Code: 20A242T

II B.Tech. II Semester Regular Examinations August 2022

**Electrical and Electronics Measurements**

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two mark**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A**

(Compulsory question)

**1. Answer ALL the following short answer questions** (5 X 2 = 10M)

CO	Blooms Level
1	2
2	2
3	1
4	1
5	1

- Give the classification of electrical measuring Instruments.
- Enumerate the errors introduced by dynamometer type wattmeter.
- Explain the significance of a Potentiometer.
- State the applications of Wein bridge.
- What are the advantages of successive approximation DVM?

**PART-B**Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks	CO	Blooms Level
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**UNIT-I**

- Explain the construction and working of PMMC instrument along with a neat diagram

12M	1	2
-----	---	---

**OR**

- Derive the equation for deflection torque if the instrument is spring controlled.
  - Explain the construction and operation of moving iron instruments.

4M	1	4
8M	1	2

**UNIT-II**

- Explain the working of a 3 phase dynamometer wattmeter. Draw a neat sketch of the wattmeter and also its connections. Describe how the mutual effects between the two elements of the wattmeter are eliminated?

12M	2	2
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**OR**

- Explain the different sources of errors in Induction type Energy meter and how they can be adjusted/compensated.

12M	2	2
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**UNIT-III**

6. Explain the term standardization of a potentiometer. Describe the procedure of standardization of dc and ac potentiometers. 12M 3 2

**OR**

7. Explain the working of Coordinate type ac Potentiometer with neat sketch 12M 3 2

**UNIT-IV**

8. Draw Maxwell's AC bridge and give the balance equation of resistance. 12M 4 3

**OR**

9. Sketch the circuit diagram of Anderson's bridge. Derive the equations for resistive and inductive components of the inductor to be measured. 12M 4 3

**UNIT-V**

10. Explain the working of successive approximation DVM with a neat sketch. 12M 5 2

**OR**

11. Write short note on the following:  
 (a) Ramp type DVM  
 (b) Digital tachometer 12M 5 2

\*\*\* End \*\*\*

Hall Ticket Number :

R-20

Code: 20A243T

II B.Tech. II Semester Regular Examinations August 2022

**Electromagnetic Fields**

(Electrical and Electronics Engineering)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two mark**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A**

(Compulsory question)

1. Answer **ALL** the following short answer questions (5 X 2 = 10M)

	CO	Blooms Level
a) What is electric flux density?	CO1	L1
b) Mention any three applications of Gauss law.	CO1	L1
c) List out the properties of vector magnetic potential.	CO2	L1
d) Deduce the expressions for H and B of toroid.	CO3	L1
e) What is Displacement current?	CO4	L1

**PART-B**Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

	Marks	CO	Blooms Level
<b>UNIT-I</b>			
2. a) State and explain Maxwell's first law.	6M	CO1	L1
b) Determine D at (4, 0, 3) if there is a point charge -5 mC at (4, 0, 0) and a line charge 3 mC/m along the y-axis.	6M	CO1	L3
<b>OR</b>			
3. a) Define and explain Coulomb's law of electrostatics field in vector form.	6M	CO1	L1
b) A charge 1 C is at (2,0,0). What charge must be placed at (-2,0,0) which will make y component of total E zero at the point (1,2,2)?	6M	CO1	L3
<b>UNIT-II</b>			
4. a) Derive the relationship between electric field and electric potential.	6M	CO2	L1
b) Two point charges of 1 micro coulomb and -1 micro coulomb are located at (0,0,1) and (0,0,-1) m respectively in free space. (i) Find the potential at (0,3,4)m (ii) Recalculate the same potential treating the charges as a pure dipole.	6M	CO2	L4
<b>OR</b>			
5. a) Show the expression of the capacitance for a spherical capacitor which consists of 2 concentric spheres of radius 'a' & 'b'. Also obtain the capacitance for an isolated sphere.	6M	CO2	L3
b) Using Laplace equations, obtain the expression to the capacity of a parallel plate condenser.	6M	CO2	L4

UNIT-III
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- |       |   |    |     |    |
|-------|---|----|-----|----|
| 6. a) | Show that the magnetic field intensity at the end of a solenoid is equal to the half of the magnetic field at the centre of the solenoid.   | 6M | CO2 | L4 |
| b)    | A filamentary current of 15A is directed in from infinity to the origin on the positive x axis and then back out to infinity along the position y axis. Use the Biot-Savart's law to find H at P (0, 0, 1). | 6M | CO2 | L4 |

OR

- |       |  |    |     |    |
|-------|--|----|-----|----|
| 7. a) | Enumerate the Biot-Savart's law for magnetic field B due to a steady line current in free space.   | 6M | CO1 | L2 |
| b)    | Find the magnetic field at a point P(0.001,0,0) m if current through the co-axial cable is 6A, which is along z-axis and a=3mm, b=9mm, c=11mm. | 6M | CO1 | L3 |

UNIT-IV
---------

- |    |                                     |     |     |    |
|----|-------------------------------------|-----|-----|----|
| 8. | Write short notes on the following: |     |     |    |
| a) | Lorentz force equation.             |     |     |    |
| b) | Magnetic dipole and dipole moment.  | 12M | CO3 | L4 |

OR

- |       |   |    |     |    |
|-------|---|----|-----|----|
| 9. a) | Derive the expression for self-Inductance of a solenoid.  | 6M | CO3 | L5 |
| b)    | A solenoid with 300 turns is 300 mm long and 30mm in diameter. If the current is 500mA, calculate i) Inductance ii) Energy stored in solenoid. Assume $\mu_r = 1$ . | 6M | CO3 | L5 |

UNIT-V
--------

- |        |   |    |     |    |
|--------|---|----|-----|----|
| 10. a) | Mention Maxwell's equations for time varying fields and make their word statements.   | 6M | CO4 | L4 |
| b)     | A parallel plate capacitor with plate area of 5cm <sup>2</sup> and plate separation of 3 mm has voltage $50 \sin 10^3 t$ V applied to its plates. Calculate displacement current. (Assuming $\epsilon = 2 \epsilon_0$ ) | 6M | CO4 | L4 |

OR

- |        |   |    |     |    |
|--------|---|----|-----|----|
| 11. a) | What is Poynting theorem? Also mention the significance of Poynting Vector. | 6M | CO4 | L4 |
| b)     | Discuss about statistically induced emf and dynamically induced emf.        | 6M | CO4 | L4 |

\*\*\* End \*\*\*

Hall Ticket Number :

**R-20****Code: 20AC45T**

II B.Tech. II Semester Regular Examinations August 2022

**Managerial Economics & Financial Analysis**

(Common to EEE &amp; ME )

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two mark**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A**

(Compulsory question)

- | 1. Answer ALL the following short answer questions ( 5 X 2 = 10M ) | CO  | Blooms Level |
|--|-----|--------------|
| a) Explain various types of demand                                 | CO1 | L3           |
| b) What are external economies of scale? Explain any two.          | CO2 | L1           |
| c) Explain disadvantages of Joint Hindu family.                    | CO3 | L3           |
| d) What are the features of capital budgeting?                     | CO4 | L1           |
| e) What are the advantages of Book Keeping?                        | CO5 | L1           |

**PART-B**Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

- |  | Marks | CO  | Blooms Level |
|--|-------|-----|--------------|
| <b>UNIT-I</b>  |       |     |              |
| 2. a) Define Managerial Economics. Explain its nature.   | 6M    | CO1 | L1           |
| b) Explain the factors governing demand forecasting.   | 6M    | CO1 | L2           |
| <b>OR</b>  |       |     |              |
| 3. a) Explain various survey methods of demand forecasting.  | 6M    | CO1 | L2           |
| b) Define Price elasticity of demand? Explain its types.   | 6M    | CO1 | L1           |
| <b>UNIT-II</b>   |       |     |              |
| 4. a) Discuss about Cob-Douglas production function.   | 6M    | CO2 | L2           |
| b) A High-Tech rail can Carry a maximum of 36000 passengers per annum at a fare of Rs 400. The variable cost of passenger is Rs.150. While the Fixed Costs are 25,00,000 per year. Find The Break-Even Point in terms of number of passengers and also in terms of fare collections. | 6M    | CO2 | L4           |
| <b>OR</b>  |       |     |              |
| 5. a) Discuss law of variable proportions with assumed data  | 6M    | CO2 |              |
| b) Define ISO-Quant. What are its Features? Explain Briefly  | 6M    | CO2 | L1           |
| <b>UNIT-III</b>  |       |     |              |
| 6. a) Explain the price determination in Monopolistic competitive market.  | 6M    | CO3 | L2           |
| b) Distinguish between 'partnership' and 'Joint Stock Company' business.   | 6M    | CO3 | L4           |
| <b>OR</b>  |       |     |              |
| 7. a) Describe 'monopoly' and 'perfect competition' with suitable examples.  | 6M    | CO3 | L2           |
| b) Explain the merits and demerits of government companies   | 6M    | CO3 |              |
| <b>UNIT-IV</b>   |       |     |              |
| 8. a) Differentiate between NPV and payback period method.   | 6M    | CO4 | L4           |
| b) What do you mean by capital? Explain its significance.  | 6M    | CO4 | L1           |
| <b>OR</b>  |       |     |              |
| 9. a) Define long term capital. Explain various sources of long-term capital.  | 6M    | CO4 | L1           |

9. b) Consider the case of the company with the following two investment alternatives each costing 4,50,000. The details of the cash inflows are as follows:

Year	Cash inflows in Rs.	
	Project-1	Project- 2
1	1,50,000	3,00,000
2	2,50,000	2,00,000
3	3,00,000	1,50,000

Calculate:

- i. Pay Back Period    ii. Accounting Rate of Return (ARR)

6M   CO4   BL3

**UNIT-V**

10. a) Discuss in detail how a liquidity and solvency ratios are useful in the financial statements.

6M   CO5   L4

- b) Define accounting. Explain various Principles of accounting.

6M   CO5   L1

**OR**

11. From the following trial balance of Mr. Suresh and Co. as at December 31, 2020, prepare trading, profit and loss account for the year ending December 31, 2020 and a balance sheet as on that date:

	Dr (Rs)	Cr (Rs)
Purchase of materials	32,000	-
Productive wages	13,000	-
Sales	-	60,000
Salaries	4,000	-
Traveling expenses	1,000	-
Carriage inwards	550	-
Insurance	300	-
Commission	650	-
Rent and rates	1,000	-
Cash in hand	350	-
Cash at bank	5,550	-
Repairs	600	-
Sundry expenses	110	-
Mortgage	-	6,100
Buildings	8,000	-
Machinery	3,000	-
Furniture	1,000	-
Stock in hand (1.1.2020)	11,500	-
Capital	-	21,310
Sundry debtors	9,000	-
Sundry creditors	-	4,200
<b>Total</b>	<b>91,610</b>	<b>91610</b>

12M   CO5   BL3

**Adjust the following:**

- a) Depreciate the following:
- Building @ 10 % per annum
  - Machinery @ 20 % per annum
  - Furniture @ 15 % per annum
- b) Provide for bad debts Rs.100
- c) Outstanding insurance Rs.50
- d) Closing stock Rs. 12,000

\*\*\* End \*\*\*



Hall Ticket Number :

R-20

Code: 20AC42T

II B.Tech. II Semester Regular Examinations August 2022

**Numerical Methods and Random Variables**

(Common to EEE &amp; ECE)

Max. Marks: 70

Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. In Part-A, each question carries **Two mark**.3. Answer **ALL** the questions in **Part-A** and **Part-B****PART-A**

(Compulsory question)

1. Answer ALL the following short answer questions (5 X 2 = 10M)

CO Blooms Level

a) Find the missing term in the following data:

$x_1$	0	1	2	3	4
$x_2$	1	3	9	...	81

CO1 L1

b) Given  $\frac{dy}{dx} = 1 - y$  with initial condition  $y = 0$  at  $x = 0$ ; find  $y$  for  $x = 0.2$  by Euler's method. Use  $h = 0.05$ .

CO2 L1

c) Find the mode of the numbers 7, 7, 7, 9, 10, 11, 11, 11, 11, 12.

CO3 L2

d) State the Addition Law of Probability.

CO4 L1

e) The average number of phone calls/minute coming into a switch board between 2 and 4 PM is 2.5. Determine the probability that during one particular minute there will be 2 calls.

CO5 L3

**PART-B**

Answer five questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO Blooms Level

**UNIT-I**2. a) Find the root of the equation  $\cos x = xe^x$  using regula-falsi method correct to four decimal places.

6M CO1 L1

b) From the following table predict the number of students who obtained marks between 40 and 45.

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

6M CO1 L3

**OR**3. a) Find the positive root of  $x^4 - 42x + 10 = 0$  correct to three decimal places, using Newton – Rapson method.

6M CO1 L1

b) Determine the polynomial  $f(x)$  using Lagrange's formula and hence find  $f(3)$ .

$x_i$	0	1	2	5
$f(x_i)$	2	3	12	147

6M CO1 L3

**UNIT-II**4. a) Use the Trapezoidal rule to calculate the integral  $\int_0^7 e^{x^2} dx$  taking 10 intervals.

6M CO2 L3

- b) Using modified Euler's method, determine  $y(0.1)$  and  $y(0.2)$  for the given equation  $\frac{dy}{dx} = \frac{1}{x^2 + y^2}$ , given that  $y(0) = 1$ .

6M CO2 L3

OR

5. a) Determine  $\int_0^1 \frac{dx}{1+x^2}$  by using Simpson's 3/8 rule.

6M CO2 L3

- b) Using Runge-Kutta method of order 4, calculate  $y(0.1)$ ,  $y(0.2)$ , given that  $\frac{dy}{dx} = xy + y^2$ ,  $y(0) = 1$ .

6M CO2 L3

## UNIT-III

6. The following table shows the marks obtained by 100 candidates in an examination. Calculate the mean, median and mode:

Marks Obtained	1-10	11-20	21-30	31-40	41-50	51-60
No. of candidates	3	16	26	31	16	8

12M CO3 L3

OR

7. Determine the correlation coefficient for the following data:

X	2	4	6	8	10
Y	5	7	9	8	11

12M CO3 L3

## UNIT-IV

8. Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each drawing. Find the probability that (a) both are white (b) first is red and second is white (c) neither is orange.

12M CO4 L2

OR

9. A random variables X has the following probability function:

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K <sup>2</sup>	2K <sup>2</sup>	7K <sup>2</sup> +K

- Determine: (i) K (ii) Evaluate  $P(X < 6)$ ,  $P(X \geq 6)$ ,  $P(0 < X < 5)$  and  $P(0 \leq X \leq 4)$  (iii) If  $P(X \leq K) > \frac{1}{2}$ , find the minimum value of K and (iv) Determine the distribution function of X (v) Mean (vi) variance.

12M CO4 L5

## UNIT-V

10. a) The probability of a man hitting a target is  $\frac{1}{3}$ . (i) If he fires 5 times, what is the probability of his hitting the target at least twice? (ii) How many times must he fire so that the probability of his hitting the target at least once is more than 90%?

6M CO5 L3

- b) In a factory producing blades, the probability of any blade being defective is 0.002. If blades are supplied in packets of 10, determine the number of packets containing (i) no defective (ii) one defective blades respectively in a consignment of 10000 packets.

6M CO5 L3

OR

11. a) If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that (i)  $26 \leq X \leq 40$  (ii)  $X \geq 45$ .

6M CO5 L1

- b) Fit a binomial distribution to the following data

x	0	1	2	3	4	5
f	2	14	20	34	22	8

6M CO5 L1

\*\*\* End \*\*\*